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PATENT APPLICATION
PO-7760
LeA 36,336

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF)
DANIEL KOCH ET AL) GROUP NO.: 1711
SERIAL NUMBER: 10/672,440) EXAMINER: D. TRUONG
FILED: SEPTEMBER 26, 2003)
TITLE: PROCESS FOR THE PRODUCTION)
OF POLYISOCYANATES OF THE)
DIPHENYLMETHANE SERIES BY)
PHOSGENATION OF NON-)
NEUTRALIZED POLYAMINE OF THE)
DIPHENYLMETHANE SERIES)

AVAILABLE COPY

LETTER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 2231-1450

Sir:

Enclosed is an Appeal Brief in the matter of the subject Appeal. Please charge the fee for filing the Brief, \$500.00, to our Deposit Account Number 13-3848. Triplicate copies of this paper are enclosed.

Respectfully submitted,

By N. Denise Brown
N. Denise Brown
Agent for Appellants
Reg. No. 36,097

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an enveloped addressed to: Commissioner for Patents, Alexandria, VA 22313-1450 October 20, 2005

Alexandria, VA 22313-1150 Date
N. Denise Brown, Reg. No. 36,097
Name of applicant, assignee or Registered Representative

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APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

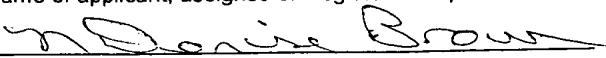
Sir:

This Brief is an appeal from the Final Office Action of the Examiner dated May 25, 2005, in which the rejection of Claims 1-9 was maintained. A Notice of Appeal was filed on August 29, 2005.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450 October 20, 2005

Date

N. Denise Brown, Reg. No. 36,097
Name of applicant, assignee or Registered Representative



Signature
October 20, 2005

Date

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I. REAL PARTY IN INTEREST

This application is assigned to Bayer AG.

II. RELATED APPEALS AND INTERFERENCES

There is one pending appeal which Appellants are aware of that may be related to, would directly affect, would be affected by or have a bearing on the Board's decision in this appeal.

This pending appeal is in U.S. Application Serial No. 10/606,399 which was filed on June 23, 2003. A Notice of Appeal was filed in this copending application on September 8, 2005 and an Appeal Brief will be filed on or before November 8, 2005. The undersigned agent is identifying this copending application which is on Appeal as related under this section as the claims therein are directed to a method of producing polyamines of the diphenylmethane series (see Claims 1, 9 and 10) and to a method of producing polyisocyanates of the diphenylmethane series (see Claims 11, 19 and 20). In the present application, the claims are directed to a process for preparing polyisocyanates of the diphenylmethane series.

The method of producing polyamines of the diphenylmethane series in U.S. Application Serial No. 10/606,399 comprises a) reacting aniline and formaldehyde in the presence of an acid catalyst to form polyamines; b) neutralizing the reaction mixture from a) with a base; and c) phase separating the neutralized reaction mixture, thereby forming an organic phase comprising polyamines of the diphenylmethane series and an aqueous phase. The method also requires that the quantity of base in step b) exceeds 100% of the stoichiometrically required quantity for neutralization of the reaction mixture. In addition, at least one alcohol is added (1) at the beginning of step b), (2) during step b), or (3) after step b) and before step c), with the molar ratio of the alcohol to the formaldehyde being at least 0.02:1. The method of producing polyisocyanates of the diphenylmethane series comprises the above method, in which the resulting polyamines are phosgenated to yield the polyisocyanates.

Aside from this, there are no interferences or other judicial proceedings which Appellants are aware of that may be related to, would directly affect, would be directly affected by or have a bearing on the Board's decision in the present appeal.

III. STATUS OF CLAIMS

The above-referenced application was filed with Claims 1-9.

Claims 1-9 are pending but stand rejected. Claims 1-9 are the subject claims of this appeal.

IV. STATUS OF AMENDMENTS

No amendments were filed by Appellants after final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Of pending Claims on Appeal, Claim 1 is the only independent Claim. Claims 2-9 are dependent directly or indirectly on Claim 1. Claim 1 is directed to a method of producing polyisocyanates of the diphenylmethane series. (In order to assist the Honorable Board in its evaluation of the invention, reference will be made to the specification in which "P" will designate a page number and "L" will designate the line number(s)). This method of producing polyisocyanates of the diphenylmethane series comprises a) reacting aniline and formaldehyde in the presence of HCl to yield a product mixture containing polyamines of the diphenylmethane series, HCl, aniline and water; b) removing excess aniline and water by distillation to yield a product mixture comprising polyamines of the diphenylmethane series, HCl, no more than 10 wt.% aniline (based on the polyamines), and no more than 5 wt. % water (based on the polyamines); and c) phosgenating the product mixture from b); wherein the acidic HCl catalyst is not neutralized. See page 4, lines 7-17; page 4, line 30 through page 5, line 19; and page 12, lines 3-15. One advantage of the present process is that a base such as NaOH is no longer required to neutralize the HCl used. See page 9,

line 29 through page 10, line 3. This also means that salt containing waste streams and the reprocessing/disposal costs associated with these waste streams is avoided by the present invention. In addition, the catalyst can be recovered and recycled back into the MDA process.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-9 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the GB 1203546 (Hoeschele) reference.

VII. ARGUMENTS

CLAIMS 1-9 ARE NOT RENDERED OBVIOUS UNDER 35 U.S.C. § 103(a) BY THE HOESCHELE REFERENCE (GB 1203546).

The Hoeschele reference, GB 1,203,546, discloses a new polyisocyanate component and a process for the production of rigid foams from this polyisocyanate composition. In particular, this polyisocyanate composition is prepared by (1) reacting at least 2.5 moles of aniline with 1 mole of formaldehyde (preferably from 2.8:1 to 3.0:1) in the presence of a mineral acid (preferably hydrochloric acid), thus forming an intermediate methylene-bridged polyphenyl polyamide mixture, (2) removing the methylenedianiline (MDA) from the intermediate polyamine mixture, thereby leaving a polyamine residue behind which contains no more than 55% by weight of methylene-dianiline, and (3) phosgenating this polyamine residue to yield the corresponding polyisocyanate composition. See page 1, lines 70-82. The resulting polyisocyanates are further described as inexpensive and lower in viscosity at a given MDI content than methylene-bridged polyphenyl polyisocyanate mixtures prepared by previously known methods.

As further described on page 2, lines 37-70, once the reaction between the aniline and formaldehyde is complete to form the polyamine mixture, the reaction mass is neutralized with an alkaline material (e.g. sodium carbonate or sodium hydroxide), and the resulting aqueous and organic phases separated. Residual

water, unreacted aniline and the desired amount of methylenedianiline (i.e. MDA) is distilled off under reduced pressure, with the polyamine residue remaining. The polyamine residue is then phosgenated as described above to yield the corresponding polyisocyanate composition.

Appellants respectfully submit that it is evident from the express disclosure of the Hoeschele et al reference the process therein requires that the HCl (or other mineral acid) present during the reaction of the aniline and the formaldehyde must be neutralized. See page 2, lines 56-65 and lines 75-97. Thus, at the beginning of the phosgenation step of the polyamines in this reference, HCl is simply not present.

By comparison, it is evident that the presently claimed invention expressly requires that the acidic HCl which is present during the reaction of the aniline and formaldehyde is **not** neutralized. This is clearly contrary to what is disclosed in the Hoeschele et al reference.

It appears that the Examiner believes that the neutralization of the mineral acid is an "optional" step in the Hoeschele et al reference. Appellants respectfully submitted that one of ordinary skill in the art would not agree with this interpretation of the reference by the Examiner.

Both Example 1 and Example 2 of the Hoeschele et al reference disclose preparation of an intermediate polyamine mixture from aniline and formaldehyde at a 3:1 molar ratio in hydrochloric acid. These examples then describe removing methylenedianiline from the polyamine mixture by distillation, and phosgenating the polyamine mixture which contains some MDA to yield the corresponding polyisocyanate mixture. Since the examples do not expressly state that the HCl used in the reaction of the aniline and formaldehyde was neutralized, the Examiner has taken the position that this is an "optional" step of the Hoeschele et al reference. See the final Office Action dated May 25, 2005 on page 2, where the Examiner stated:

"... the reference does not disclose any strong base in the process to neutralize a strong acid, i.e. HCl, before phosgenation step."

In addition, in the Advisory Action dated August 10, 2005, the Examiner stated in Section 11 that:

"... none of either Examples discloses the use of any alkaline materials to neutralize HCl in any steps of the process in the reference. That means this step is not required."

Appellants respectfully disagree. It is not unusual for examples to not specify each and every aspect of a process, particularly when a specific aspect of the process is routine and would be recognized as such by one of ordinary skill in the art. It is readily apparent that the specification does not indicate neutralization of the HCl is "optional" as stated by the Examiner. The interpretation of neutralization as being "optional" is contrary to the express disclosure of the Hoeschele et al reference, and thus, can not be proper.

It is further submitted that the fact that both of these examples disclose that, after the phosgenation step is completed, the reaction mixture is swept by nitrogen to remove unreacted phosgene and **by-product hydrochloric acid** supports Appellants' position that the HCl present during the reaction of aniline and formaldehyde has been neutralized. See Example 1 at page 3, lines 100-108 and Example 2 at page 4, lines 91-105. The Hoeschele et al reference clearly characterizes this hydrochloric acid as a by-product. It is readily apparent from this term (i.e. by-product) that the HCl referred to here is not HCl which was present during the reaction of aniline and formaldehyde, but rather is HCl that routinely results from the phosgenation of polyamines to polyisocyanates.

As would be recognized and understood by one of ordinary skill in the art, the phosgenation of polyamines routinely forms the desired polyisocyanates corresponding to the polyamines, and the by-product HCl. This is supported by the Polyurethane Handbook, 2nd Edition, Gunter Oertel, pp.76-77. (See enclosed copy which is identified in Evidence Appendix as Item (A). This item was previously submitted by Appellants with their response after final which was filed on July 25, 2005.) The phosgenation reaction is summarized in steps (2) and (3). In step (2), the cold phosgenation, the amine ($R-NH_2$) and phosgene ($COCl_2$) react to form the carbamoyl chloride ($R-NH-CO-Cl$) and hydrochloric acid (HCl). In step (3), the hot

phosgenation, the carbamoyl chloride (R-NH-CO-Cl) splits off hydrogen chloride (HCl) and yields the desired isocyanate (R-NCO). Accordingly, hydrogen chloride is a by-product of the reaction between the amine compound and phosgene to produce the desired isocyanate.

Appellants respectfully submit that this information clearly supports Appellants' position that HCl is routinely formed during phosgenation of a polyamine to the corresponding polyisocyanate. Thus, HCl is a by-product of the phosgenation. It is therefore submitted that the HCl referred to as a by-product in Examples 1 and 2 of the Hoeschele et al reference is this HCl which results from the phosgenation of the polyamine. This is **not** referring to HCl from the reaction of the aniline and formaldehyde.

Furthermore, the term "by-product" as used in the working examples clearly implies that this HCl is that which was produced naturally in the phosgenation process as a by-product. See page 3, line 108 and page 4, line 105 of the Hoeschele et al reference. Appellants respectfully submit that the dictionary definition of the term "by-product" supports their interpretation of the reference. See Webster's Ninth New Collegiate Dictionary, 1990, on p. 192. (See copy enclosed which is identified in the Evidence Appendix as Item (B). This item was also previously submitted by Appellants with their response after final which was filed on July 25, 2005.) According to the dictionary, by-product is defined as: "1: something produced in a usu. industrial process in addition to the principal product 2: a secondary and sometimes unexpected or unintended result". Accordingly, the term "by-product" as used in the examples of the Hoeschele et al reference would **not** be an appropriate term to describe HCl in the final product if it indeed remained in the polyamine mixture that was eventually phosgenated to form the desired polyisocyanate mixture.

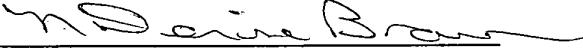
Appellants respectfully submit that upon reading the complete disclosure of the Hoeschele et al reference and interpreting it as one of ordinary skill in the art would, it is readily apparent that the HCl present during the reaction of the aniline and the formaldehyde is neutralized. It is also evident that the by-product HCl that occurs after the phosgenation step as described in the working examples, is the HCl that naturally forms as a by-product during the phosgenation of polyamines.

This is not HCl remaining in the polyamines that has not been neutralized as suggested by the Examiner. One of ordinary skill in the art would obviously recognize that the HCl by-product mentioned in the examples is not HCl remaining from the initial reaction of aniline and formaldehyde which has not been neutralized.

There is no suggestion by the Hoeschele et al reference to conduct the complete process in the presence of acidic HCl which has not been neutralized as is required by the presently claimed invention. Appellants respectfully submit that this reference does not properly render the presently claimed invention unpatentable under 35 U.S.C. §103(a).

In view of the preceding arguments, Appellants' respectfully submit that each of the Examiner's rejections is in error and respectfully request that the rejections be reversed. The allowance of Claims 1-9 is respectfully requested.

Respectfully submitted,

By 
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VIII. CLAIMS APPENDIX:

The following is a listing of the claims on Appeal.

Claim 1. A method of producing polyisocyanates of the diphenylmethane series comprising:

- a) reacting aniline and formaldehyde in the presence of HCl to provide a product mixture containing polyamines of the diphenylmethane series, HCl, aniline and water;
- b) removing excess aniline and water by distillation to provide a product mixture comprising polyamines of the diphenylmethane series, HCl, no more than 10 wt.% aniline based on the polyamines, and no more than 5 wt.% water based on the polyamines; and
- c) phosgenating the product mixture from (b) which comprises polyamines of the diphenylmethane series, HCl, no more than 10 wt.% aniline based on the polyamines, and no more than 5 wt.% water based on the polyamines;

wherein the acidic HCl catalyst is not neutralized.

Claim 2. The method according to Claim 1, wherein the distillation is performed in the presence of an entrainer.

Claim 3. The method according to Claim 1, wherein the distillation is performed by a method comprising removing aniline by distillation in the presence of water as entrainer; and removing water by distillation.

Claim 4. The method according to Claim 1, wherein, the product mixture in (b) comprises no more than 2 wt.% aniline based on the polyamines, and no more than 1 wt.% water based on the polyamines.

Claim 5. The method according to Claim 2, wherein, the product mixture in (b) comprises no more than 2 wt.% aniline based on the polyamines, and no more than 1 wt.% water based on the polyamines.

Claim 6. The method according to Claim 3, wherein, the product mixture in (b) comprises no more than 2 wt.% aniline based on the polyamines, and no more than 1 wt.% water based on the polyamines.

Claim 7. The method according to Claim 1, wherein the product mixture in (b) comprises no more than 0.2 wt.% aniline based on the polyamines, and no more than 0.1 wt.% water based on the polyamines.

Claim 8. The method according to Claim 2, wherein the product mixture in (b) comprises no more than 0.2 wt.% aniline based on the polyamines, and no more than 0.1 wt.% water based on the polyamines.

Claim 9. The method according to Claim 3, wherein the product mixture in (b) comprises no more than 0.2 wt.% aniline based on the polyamines, and no more than 0.1 wt.% water based on the polyamines.

IX. EVIDENCE APPENDIX:

Appellants' have submitted the following evidence:

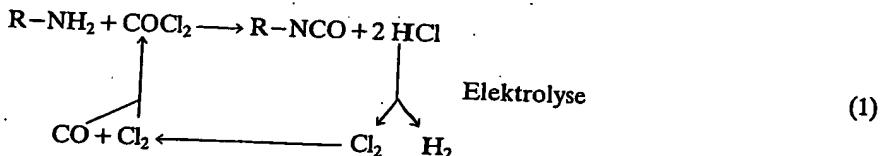
- (A) Polyurethane Handbook, 2nd Edition, Gunter Oertel, pp.76-77.
- (B) Webster's Ninth New Collegiate Dictionary, 1990, on p. 192.

Polyurethane

A

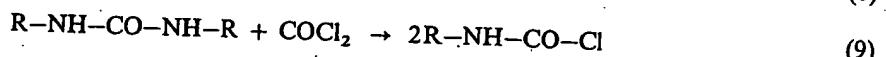
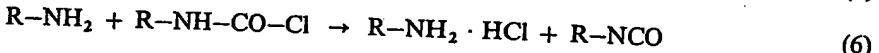
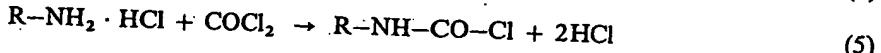
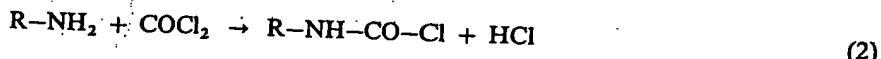
3.2.3.1 Phosgenation

All technically important isocyanates are obtained only through the reaction of the corresponding amine with phosgene [4, 8, 11]. The phosgene needed for the reaction is continuously produced in the phosgenation unit from CO and Cl₂ and then directly reacted with the amine. Thus, the amount of phosgene present in the phosgenation unit can be reduced to a minimum. The HCl gas, which is a co-product of the reaction, is either used for other chemical reactions or reconverted to chlorine by means of HCl-electrolysis. With the complete recycling (HCl-electrolysis), the phosgenation process is self-sufficient in chlorine.



Phosgene, which was used as a war gas during World War I, has been used in large amounts for decades as an intermediate by the chemical industry. It is a colorless gas, which boils under normal pressure at 8 °C. Because of its high toxicity and the correspondingly low MAK value (0,4 mg/m³), phosgenation units are equipped to meet a high technical level of safety standards. This includes, among other items, the installation of redundant, automatic, phosgene detectors, additional enclosures for phosgene containing equipment and pipes, and, in case of a leak, the isolation of the total facility from the surrounding area by means of a ammonia-steam-curtain. Escaping phosgene is thus directly destroyed through the reaction with ammonia to ammonium chloride and carbonic acid.

The change of reaction conditions has a substantial influence on the yield and product quality. In the complex chemical course of the process, numerous intermediate steps and by-product reactions occur. The most important:



The reaction course can be represented as follows: In the first step (cold phosgenation) the amine or the amine hydrochloride is acylated with phosgene to the carbamoyl chloride (2,5). The liberated hydrogen chloride forms with free amine the amine hydrochloride (4). This reaction is dependent on the basicity of the amine and the reaction conditions. The salt formation results in the amine group losing its basicity and thus not reacting with any NCO groups present. In the second step (hot phosgenation), the carbamoyl chloride splits off hydrochloride (3) and thus the desired isocyanate is formed. However, along with this main

reaction the carbamoyl chloride can, especially when not enough phosgene excess is present, react with free amine to form urea and HCl (7). Urea is also formed by the reaction of an isocyanate with a free amine (8). While monofunctional amines in this case form symmetrical disubstituted ureas, the di- and polyamines give polymeric compounds. With excess phosgene the urea can be split into the carbamoyl chloride (9). As this splitting off proceeds only slowly and even at elevated temperatures is not quantitative, the urea formation must be, as much as possible, avoided [12]. For this reason excess phosgene is preferred. Further reactions of isocyanate groups such as shown in subsection 3.2.1, can lead, for example, to biurets, carbodiimides, uretdiones and isocyanates. These compounds can tie up small amounts of phosgene which in the distillation step can be split off and removed.

3.2.3.2 Phosgenation Process

The most important process for the industrial production of polyisocyanates is the phosgenation of the corresponding amine in the fluid phase at normal or slightly elevated pressure with use of a solvent [5]. The reaction with phosgene can take place both continually and discontinuously. The course of reaction is commonly separated into two temperature steps, i.e., cold and hot phosgenation. In the first step the amine is reacted with phosgene in a fast exothermic reaction at low temperatures and produces a mixture of carbamoyl chloride and amino hydrochloride. This reaction mixture is subsequently "thoroughly phosgenated" at higher temperatures until the HCl evolution is ended. In the cold phosgenation step an intensive and quick mixing of the components has a deciding influence on a smooth course of the reaction, especially for the maximization of the yield. The optimization of this process step with regard to the problems resulting from the handling of solids between 20 and 80°C was the goal of much development work. This led to the use of mixing nozzles, in-line mixers, turbulent reactors, pumps, counter current mixing chambers, and other mixing equipment with high shear effect and turbulence [4, 5]. Inert organic compounds are useful as solvents. These solvents boil below the prepared isocyanate which results in not only separation by distillation but also enables the highest possible temperature of reaction in the second phosgenation step. Chlorobenzene and ortho dichlorobenzene have been generally accepted as the most commonly used solvents.

The hot phosgenation proceeds with excess phosgene at temperatures up to 180°C. It can take place in cascade of tanks, vertically or horizontally arranged pipe reactors or in packed columns, towers, etc. In this step, mixing is no longer necessary because the large amount of evolved hydrochloric acid produces sufficient turbulence. In modern continuous processes the cold phosgenation step is, as regards the apparatus, energetically distinctly separated from the hot phosgenation step. The high reaction velocity and the heat of reaction of this exothermic step can be effectively used in this way.

The low pressure phosgenation in the fluid phase is illustrated in Fig. 3.2 by a simplified process flow diagram. For the sake of clarity in the illustration, the technical details and parallel installations have been eliminated. The large volume products, TDI and MDI, can be manufactured in this manner using ortho dichlorobenzene for TDI and monochlorobenzene for MDI, respectively, as solvents. The yield in the TDI process lies between 90 and 96% of the theoretical yield. With MDI inclusive its homologs the yield is 100%.

Pressure processes that operate with an elevated pressure of 3 to 20 bar or higher are also known and have been demonstrated suitable for industrial scale production of isocyanates [5, 13 to 15]. They have the advantage of high reaction velocity and small reaction volumes, but the disadvantages are the known technical problems with high pressure processes. The gas-phase phosgenation is regarded as a special case. It is applicable only when the starting amine can be vaporized without decomposition [16, 17]. In this process, the reaction is accomplished by mixing the components, amine and phosgene, in the gas phase.



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Ninth New Collegiate Dictionary

A Merriam-Webster®

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Springfield, Massachusetts, U.S.A.



A GENUINE MERRIAM-WEBSTER

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button quail *n* (1885) : any of various small terrestrial Old World birds (family Turnicidae) that resemble quails, have only three toes on a foot with the hind toe being absent, and are related to the cranes and bustards

button snakeroot *n* (1775) 1 : any of a genus (*Liatris*) of composite plants with spikes of rosy-purple rayless flower heads 2 : any of several usu. prickly herbs (genus *Eryngium*) of the carrot family

but-ton-wood *n* [ME *butes*, fr. MF *bouterez*, fr. OF *boterez*, fr. *boter* — more at BUTT] (14c) 1 : a projecting structure of masonry or wood for supporting or giving stability to a wall or building 2 : something that resembles a buttress: as a : a projecting part of a mountain or hill b : a horny protuberance on a horse's hoof at the heel — see HOOF illustration c : the broadened base of a tree trunk or a thickened vertical part of it 3 : something that supports or strengthens (a ~ of the cause of peace) — **buttressed** *adj*

buttress *v* (14c) : to furnish or shore up with a buttress; also : SUPPORT. STRENGTHEN (arguments ~ed by solid facts)

butt shaft *n* (1588) : a target arrow without a barb

butt-stock *n* [ca. 1909] : the stock of a firearm in the rear of the breech mechanism

butt weld *n* (ca. 1864) : a butt joint made by welding — **butt-weld** *vt* — **butt-welding** *n*

butty \bətē\ *n, pl* **butties** [origin unknown] chiefly Brit (ca. 1790) : a fellow worker : CHUM, PARTNER

bu-tut \bū-tüt\ *n, pl* **bututs** or **butut** [native word in Gambia] (1971) — see *dalasi* at MONEY table

bu-tyl \bütēl\ *n* [ISV *butyric* + -yl] (ca. 1868) : any of four isomeric univalent radicals C_4H_9 derived from butane

Butyl trademark — used for any of various synthetic rubbers made by polymerizing isobutylene

butyl alcohol *n* (ca. 1869) : any of four flammable alcohols C_4H_9OH derived from butane and used in organic synthesis and as solvents

bu-tyl-ate \bütēl-āt\ *vt* -at-ed; -ating (1942) : to introduce the butyl group into (a compound) **bu-tyl-ation** \bütēl-ā-shən\ *n*

butyl-hydroxy-an-isole \bütēl-hī-dräk-sē-an-sōl\ *n* [*hydroxy* + *anisole*] fr. L *anisum* anise + E -ol — more at ANISE] (1950) : BHA

butylated hydroxyltoluene \bütēl-hōk-sil-tü-ü-nē\ (1961) : BHT

butyl-ene \bütēl-ēn\ (1877) : any of three isomeric hydrocarbons C_4H_8 of the ethylene series obtained usu. by cracking petroleum

butyr- or **butyro-** **comb form** [ISV, fr. *butyric*] : butyric (butyral)

buty-ri-caeous \bütēr-i-kāshōs\ *adj* [L *butyrum* butter — more at BUTTER] (1668) 1 : resembling or having the qualities of butter 2 : yielding a buttery substance

buty-ral \bütēr-äl\ (1888) : an acetal of butyraldehyde

buty-ral-de-hyde \bütēr-äl-dä-hid\ [ISV] (ca. 1888) : either of two aldehydes C_4H_6O used esp. in making polyvinyl butyral resins

buty-rate \bütēr-ät-rät\ *n* (1873) : a salt or ester of butyric acid

buty-ric \bütēr-tir-ik\ *adj* [F *butyrique*, fr. L *butyrum*] (1826) : relating to or producing butyric acid (~ fermentation)

butyric acid *n* (1826) : either of two isomeric fatty acids $C_4H_8O_2$; esp. : a normal acid of unpleasant odor found in rancid butter and in perspiration

buty-ro-phe-none \bütēr-o-föf-nöñ\ *n* [*butyr-* + *phen-* + *-one*] (1945) : any of a class of neuroleptic drugs (as haloperidol) used esp. in the treatment of schizophrenia

bux-om \bük-säm\ *adj* [ME *buxsum*, fr. (assumed) OE *bühsum*; akin to OE *bügan* to bend — more at BOW] (12c) 1 *obs* a : OBEDIENT, TRACTABLE b : offering little resistance : FLEXIBLE, PLIANT (wing silently the ~ air —John Milton) 2 *archaic* : full of gaiety : BLITHE 3 : vigorously or healthily plump; specif. : full-bosomed — **bux-om-ly** *adv* — **bux-om-ness** *n*

buy \bū\ *vb* bought \bōt\; **buy-ing** [ME *byen*, fr. OE *byegan*; akin to Goth *būjan* to buy] *vt* (bef. 12c) 1 : to acquire possession, ownership, or rights to the use or services of by payment esp. of money : PURCHASE 2 a : to obtain in exchange for something often at a sacrifice (they bought peace with their freedom) b : REDEEM 6 3 : BRIBE, HIRE 4 : to be the purchasing equivalent of (the dollar ~s less today than it used to) 5 : ACCEPT, BELIEVE (I don't ~ that hokey) ~vi 1 : to make a purchase — **buyer** \bū(-ə)r\ *n* — **buy time** : to delay an imminent action or decision : STALL (*buying time* against the day when air pollution . . . reaches critical and dangerous proportions —*Plainman*)

buy n (1879) 1 : something of value at a favorable price; esp. : **BARGAIN** (it's a real ~ at that price) 2 : an act of buying : PURCHASE

buyer's market *n* (1926) : a market in which goods are plentiful, buyers have a wide range of choice, and prices tend to be low — compare SELLER'S MARKET

buy off *vt* (1629) 1 : to induce to refrain (as from prosecution) by a payment or other consideration 2 : to free (as from military service) by payment

buy out *vt* (1644) : to purchase the share or interest of

buy up *vt* (1533) 1 : to buy freely or extensively 2 : to buy the entire available supply of

buzz \büz\ *vb* [ME *bussen*, of imit. origin] vi (14c) 1 : to make a low continuous humming sound like that of a bee 2 a : MURMUR, WHISPER b : to be filled with a confused murmur (the room ~ed with excitement) 3 : to make a signal with a buzzer 4 : to go quickly : HURRY; also : SCRAM — usu. used with off ~ *vt* 1 : to utter covertly by or as if by whispering 2 : to cause to buzz 3 : to fly low and fast over (planes ~ the crowd) 4 : to summon or signal with a buzzer 5 *Brit Eng* : to drink to the last drop (get some more port whilst I ~ this bottle) —W. M. Thackeray

buzz n (1612) 1 a : RUMOR, GOSSIP b : a confused murmur or flurry of activity 2 : a persistent vibratory sound 3 : a signal conveyed by buzzer; specif. : a telephone call

buzzard \büz-ard\ *n* [ME *busrad*, fr. OF, alter. of *buisson*, fr. L *buteon-* buteo hawk; akin to Gr *bysas* eagle-owl] (13c) 1 chiefly Brit : BUTEO 2 : any of various usu. large birds of prey (as the turkey vulture) 3 : a contemptible or rapacious person

buzz bomb *n* (1944) : ROBOT BOMB

buzz-er \büz-ər\ *n* (1606) 1 : one that buzzes; specif. : an electric signaling device that makes a buzzing sound 2 : the sound of a buzzer (sank a 20-foot jump shot at the ~)

buzz saw *n* (1858) : CIRCULAR SAW

buzz-word \büz-word\ *n* (1967) : an important-sounding usu. technical word or phrase often of little meaning used chiefly to impress laymen B.V.D., bē-(vē-)dēv\ trademark — used for underwear

B vitamin *n* (1940) : any vitamin of the vitamin B complex bwa-na \bwän-a\ *n* [Swahili, fr. Ar *abūna* our father] (1878) : MASTER, BOSS

b'y \b'ē\ *bi*, esp before consonants **bi** *prep* [ME, prep. & adv., fr. OE, prep., be, bi; akin to OHG *bī* by, near, L *ambi-* on both sides, around, Gk *amphi*] (bef. 12c) 1 : in proximity to : NEAR (standing ~ the window) 2 a : through or through the medium of : VIA *(enter ~ the door)* b : in the direction of : TOWARD (north ~ east) c : into the vicinity of and beyond : PAST (went right ~ him) 3 a : during the course of (studied ~ night) b : not later than (~ 2 p.m.) 4 a : through the agency or instrumentality of (~ force) b : sired or borne by 5 : with the witness or sanction of (~ swear ~ all that is holy) 6 a : in conformity with (acted ~ the rules) b : ACCORDING TO (always bought ~ brand) (called her ~ name) 7 : with respect to 8 a : in or to the amount or extent of (win ~ a nose) b chiefly Scot : in comparison with ; BESIDE 9 — used as a function word to indicate successive units or increments (succeeded little ~ little) (walk two ~ two) 10 — used as a function word in multiplication, in division, and in measurements (divide a ~ b) (multiply 10 ~ 4) (a room 15 feet ~ 20 feet)

b'y \b'ē\ *adv* (bef. 12c) 1 a : close at hand : NEAR b : at or to another's home (stop ~ for a chat) 2 : PAST (saw him go ~) 3 : ASIDE, AWAY

b'y or bye \b'ē\ *adv* (14c) 1 : being off the main route : SIDE 2 : INCIDENTAL

b'y or bye \b'ē\ *n, pl* **byes** \b'iz\ (1567) : something of secondary importance ; a side issue — by the **b'y** BY THE WAY, INCIDENTALLY

b'y or bye \b'ē\ *interj* [short for *goodbye*] (1709) — used to express farewells; often used with following now

b'y-and-by \b'ē-an-b'ē\ *n* (1591) : a future time or occasion

b'y-and-by \b'ē-an-b'ē\ *adv* (1526) : before long : SOON

b'y-and-large \b'ē-an-lärj\ *adv* (1669) : on the whole : in general

b'y-blow \b'ē-blō\ *n* (1594) 1 : an indirect blow 2 : an illegitimate child

b'y-b'ī *n* [alter. of *b'y*] (1883) : the position of a participant in a tournament who has no opponent after pairs are drawn and advances to the next round without playing

b'y-bye or **by-by** \b'ē-b'ē\ *interj* [baby-talk redupl. of *goodbye*] (1736) — used to express farewell

b'y-bye or **by-by** \b'ē-b'ē\ *adv* (1917) : out esp. for a walk or ride — used with the verb go (if he wants to go ~ the baby may pat his head to indicate his desire for a hat —A.L. Gesell & Frances L. Ilg)

b'y-bye or **by-by** \b'ē-b'ē\ *n* (1867) : BED, SLEEP (lie down . . . and go to ~ —Rudyard Kipling)

b'y-bye or **by-by** \b'ē-b'ē\ *adv* (1920) : to bed or sleep — used with the verb go (I'll run in and read for just a second . . . and then perhaps I'll go ~ —Sinclair Lewis)

b'y-election also **b'y-election** \b'ē-ə-lek-shən\ *n* (1880) : a special election held between regular elections in order to fill a vacancy

b'y-gone \b'ē-gōn\ *adj* (15c) : gone by : PAST; esp. : OUTMODED — **b'y-gone** *n*

b'y-law or **b'y-law** \b'ē-law\ *n* [ME *bilaw*, prob. fr. (assumed) ON *býlog*, fr. ON *bý* town + *lög* law] (13c) : a rule adopted by an organization chiefly for the government of its members and the regulation of its affairs

b'y-line \b'ē-lin\ *n* (1916) 1 : a secondary line : SIDELINE 2 : a line at the beginning of a news story, magazine article, or book giving the writer's name

b'y-line *vt* (1938) : to write (an article) under a byline — **b'y-line** \b'ē-lin\ *n*

b'y-name \b'ē-näm\ *n* (14c) 1 : a secondary name 2 : NICKNAME

b'y-pass \b'ē-pas\ *n* (1848) 1 : a passage to one side; esp. : a deflected route us. around a town 2 a : a channel carrying a fluid around a part and back to the main stream b : SHUNT 1b, 1c

bypass *vt* (1886) 1 a : to avoid by means of a bypass b : to cause to follow a bypass 2 a : to neglect or ignore usu. intentionally b : CIRCUMVENT

b'y-past \b'ē-past\ *adj* (15c) : BYGONE

b'y-path \b'ē-path\, -path\ *n* (14c) : BYWAY

b'y-play \b'ē-plā\ *n* (1812) : action engaged in on the side while the main action proceeds (as during a dramatic production)

b'y-product \b'ē-präd'-ükt\ *n* (1857) 1 : something produced in a usu. industrial process in addition to the principal product 2 : a secondary and sometimes unexpected or unintended result (unpleasant ~ of civilization)

b're \b're\ *n* [ME, fr. OE *bȳre*; akin to OE *būr* dwelling — more at BOWER] **b're** *chiefly Brit* (bef. 12c) : a cow barn

b'ro \b'rō\ *n* (1673) : BYWAY

b'ron \b'rōn\ *adj* (1823) : of, relating to, or having the characteristics of the poet Byron or his writings — **b'ron-ic** \b'rōn-ik\ *n*

b'ss-ni-sis \b'ss-ni-sis\, **b'ss-a-nō-sis** *n, pl* **b'ss-ses** \b'ss-zē\ [NL, fr. L *bissinus*] fine linen, fr. Gr *bissinos*, fr. *bissos* (ca. 1890) : an occupational respiratory disease associated with inhalation of cotton, flax, or hemp dust and characterized initially by chest tightness, shortness of breath, and cough and eventually by irreversible lung disease

b'ss-sus \b'ss-süs\ *n, pl* **b'ss-ses** or **b'ss-si** \b'ss-i\, -jē\ [ME *bissus*, fr. ML *bissus*, fr. L, fr. Gr *bissos* flax, of Sem. origin; akin to Heb *bis* line cloth] (14c) 1 : a fine prob. linen cloth of ancient times 2 [NL, fr. L] : a tuft of long tough filaments by which some bivalve mollusks (b'ss) adhere to a surface

b'stander \b'stān-dər\ *n* (1619) : one present but not taking part in a situation or event : a chance spectator

b'street \b'street\ *n* (1672) : a street off a main thoroughfare : side street

b'ite \b'it\ *n* [perh. alter. of *b'ite*] (ca. 1962) : a group of adjacent binary digits often shorter than a word that a computer processes as a unit (as 8-bit ~)

b'way *adv* (1548) : in passing : INCIDENTALLY

X. RELATED PROCEEDINGS APPENDIX:

Appellants' identified U.S. Application Serial No. 10/606,399 which was filed in the U.S. Patent and Trademark Office on June 23, 2003 under Section II, titled "RELATED APPEALS AND INTERFERENCES". The appeal in this application is pending at the Board. Accordingly, there is nothing to submit under this section.

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